

Michael L. Nelson

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Education

PhD, 2000, Computer Science, Old Dominion University, Norfolk, VA
Dissertation: *Buckets: Smart Objects for Digital Libraries*; Advisor: Kurt Maly
MS, 1997, Computer Science, Old Dominion University, Norfolk, VA
BS, 1991, Computer Science, Virginia Tech, Blacksburg, VA

Experience

Visiting Assistant Professor, University of North Carolina, 2000–2001

- Received a NASA sponsored Information Technology Fellowship for a post–doctoral residence at the School of Information and Library Science at the University of North Carolina at Chapel Hill.
- Extending doctoral research on "buckets", including information survivability and bucket "flocking".
- Teaching introductory and advanced digital library classes; guest lecturing in classes and research seminars.

Adjunct Assistant Professor, Old Dominion University, 2000–present

Adjunct Instructor, Old Dominion University, 1999–2000

- Designed a graduate level computer science class in digital libraries, which focused on current research in the NASA/ODU digital library program.
- Taught the class during the Spring 1998 and Spring 1999 sessions, with many of the class projects resulting in publications.
- Class recognized as one of 20 DL classes in the world, and one of 12 in the United States (*Spink & Cool, D–Lib Magazine, May 1999*).

Electronics Engineer, Data Analysis and Imaging Branch, NASA LaRC, 1999 – present

Electronics Engineer, Information Management Branch, NASA LaRC, 1996 – 1999

- Perform digital library research, development, implementation, and maintenance.
- Key contributor to the Open Archives Initiative (OAI), a metadata harvesting protocol and reference implementation.
- Lead student in the digital libraries group at Old Dominion University, and lead for the NASA Langley Research Center's digital library effort.
- Coordinate the digital library efforts of 7 students at ODU and 10 staff members at NASA.

- Responsible for the planning and transition of the next generation of digital library technology at NASA.
- Significant research contributions include *clusters*, a way of partitioning collections; *buckets*, aggregative and intelligent archival entities; and the Smart Objects Dumb Archive (SODA) model for digital libraries.
- Presented bucket technology to members of the Air Force Research Laboratory, various branches of the Navy, Los Alamos National Laboratory and others, investigating possible joint applications for buckets.
- Developed the DTRTWT image processing software (serves scanned images in a WWW-friendly manner) for the NACA Digital Library.
- Transferred the DTRTWT to a company in Washington DC for commercialization.
- Served on Langley's "Ultrafast" group (headed by Jarek Sobieski), studying the engineering implications of nascent computer technologies.

Electronics Engineer, Advanced Computer Systems Branch, NASA LaRC, 1991 – 1996

Information Systems Work:

- Lead Webmaster for NASA Langley Research Center.
- Developed first center home page for NASA in 1993.
- Ground floor contributions to the foundation of NASA web architecture.
- Elected head NASA webmaster and chaired NASA's Webmaster working group during 95/96 season.
- Directed development for many web services for Langley and NASA. Provided local implementation and coordinated remote implementation. Services include: the award winning NASA Technical Report Server, the Langley Technical Report Server, the Langley Software Server, Langley Home Page, LANTERN (Langley Intranet), Advanced Concepts Technology message board, and many restricted internal resources.
- Co-coordinator of Internet Fair 1, and Internet Fair 2.
- Represented Langley's WWW projects at many conferences and local trade shows.
- Co-founder of Southeastern Virginia Regional Network (SEVAnet).

Distributed and Parallel Computing Work:

- Project manager for Borg Workstation Cluster, the first production DCE/DFS workstation cluster.
- Held spending authority of over \$800,000.
- Managed activities for team with over 20 members.
- Co-wrote the proposal for the Hive, the Borg follow-on project.
- Performed extensive evaluations of cluster computing services.
- Lead the Division's Innovation Group, which ultimately produced the seminal Integrated Computing Environment Proposal (ICE). ICE provides an efficient model for remote management and integration of heterogeneous computing systems.
- Modified PVM source code to work on the Intel i860 Hypercube.

- Evaluated vendor proposals and recommended purchasing decisions for massively parallel computers at Langley.

Students & Faculty Mentored at NASA

- Prof. David Johnson, ASEE, St. Paul's College, Summer 1998
- Delwin R. Croom Jr., ERI, Old Dominion University, Summer 1998, Summer 1997
- Sandra L. Esler, co-op, University of Alabama, Summer 1996, Fall 1995
- Joseph A. Kaplan, co-op, Virginia Tech, Summer 1993
- Ming-Hokng Maa, co-op, MIT, Summer 1996, Summer 1995

Classes Taught

- INLS 110-098, Introduction to Digital Libraries, UNC, Spring 2000
- INLS 210-098, Complex Objects in Digital Libraries, UNC, Spring 2000
- CS 495/595, Introduction to Digital Libraries, ODU, Spring 1999, 7 students
- CS 745/845, Introduction to Digital Libraries, ODU, Spring 1998, 7 students

COTR

- Vision Micro Design, Inc., "Low-Cost Design and Manufacturing of GA Cockpit Displays Using Projection LCDs", 1999. (SBIR NAS1-99014)

Clearance

Received "secret" clearance, May 1999.

Awards and Recognition

2000 – IT Fellowship Program (Postdoctoral research at UNC-Chapel Hill)
 2000 – Cash Award for Bucket Research Excellence
 1996 – Industry.Net Best Technical Site for the NASA Technical Report Server
 1994 – Team Excellence Award for Internet Fair 1
 1993 – Cash Award for Langley Technical Report Server

Affiliations

Member: ACM, ASIS, IEEE CS, USENIX

Technical Publications

1. Michael L. Nelson, "Buckets: Smart Objects for Digital Libraries," PhD Dissertation, Department of Computer Science, Old Dominion University, August 2000.
2. Mohammad Zubair, Kurt Maly, Imran Ameerally and Michael L. Nelson, "Dynamic Construction of Federated Digital Libraries," Poster, WWW9 Conference, Amsterdam, The Netherlands, May 15–19, 2000.
3. Nancy R. Kaplan and Michael L. Nelson, "Determining the Publication Impact of a Digital Library," *Journal of the American Society of Information Science*, 51(4), 2000, pp. 324–339.
4. Herbert Van de Sompel, Thomas Krichel, Michael L. Nelson, Patrick Hochstenbach Victor M. Lyapunov, Kurt Maly, Mohammad Zubair, Mohamed Kholief, Xiaoming Liu, and Heath O'Connel, "The UPS Prototype project: team, goals, motivation and relation to the Santa Fe Convention," *D-Lib Magazine*, 6(2), February 2000.
5. Michael L. Nelson and Kurt Maly, "Preserving the Pyramid of Scientific and Technical Information (STI) Using Buckets," *Proceedings of the Fourth International Conference on Grey Literature*, Washington DC, October 4–5, 1999, pp. 76–87.
6. Kurt Maly, Mohammad Zubair, Xiaoming Liu, Michael L. Nelson, and Steven J. Zeil, "Structured Course Objects in a Digital Library," *Proceedings of the International Symposium on Digital Libraries*, Tsukuba Japan, September 28–29, 1999, pp. 89–96.
7. Michael L. Nelson, Kurt Maly, Mohammad Zubair, and Stewart N. T. Shen, "SODA: Smart Objects, Dumb Archives," *Proceedings of The Third European Conference on Research and Advanced Technology for Digital Libraries (ECDL'99)*, Paris, France, September 22–24, 1999, Lecture Notes in Computer Science, Vol. 1696, pp. 453–464. (Also available as ODU CS TR–98–09).
8. R. T. Bierdon, P. Mehrotra, M. L. Nelson, F. S. Preston, J. J. Rehder, J. L. Rogers, D. H. Rudy, J. Sobieszczanski–Sobieski and O. O. Storaasli, "Compute as Fast as Engineers Can Thinkg – Ultra Fast Computing Team Report," NASA TM–1999–209715, September 1999.
9. Michael L. Nelson, , "A Digital Library for the National Advisory Committee for Aeronautics," NASA/TM–1999–209127, April 1999.
10. Michael L. Nelson, Kurt Maly, Delwin R. Croom Jr. and Steven W. Robbins, "Metadata and Buckets in the Smart Object, Dumb Archive (SODA) Model," *Proceedings of the Third IEEE Meta-data Conference*, April 6–7, 1999, Bethesda Md.

11. Kurt Maly, Michael L. Nelson, and Mohammad Zubair, "Smart Objects, Dumb Archives: A User-Centric, Layered Digital Library Framework," *D-Lib Magazine*, 5(3), March 1999.
12. Kurt Maly, Mohammad Zubair, Stewart N. T. Shen, and Michael L. Nelson, "Generalizing an Existing Digital Library," Old Dominion University CS TR-99-01, February 1999.
13. Michael L. Nelson, Kurt Maly, Stewart N. T. Shen and Mohammad Zubair, "Buckets: Aggregative, Intelligent Agents for Publishing," *Webnet Journal*, 1(1), 1999, pp. 58-66. (Also available as NASA/TM-1998-208419 and ODU CS TR-97-41).
14. Melissa E. Tiffany and Michael L. Nelson, "Creating a Canonical Scientific and Technical Information Classification System for NCSTRL+," NASA/TM-1998-208955, December 1998.
15. Michael L. Nelson, Kurt Maly, and Mohammad Zubair, "Interoperable Heterogeneous Digital Libraries," Old Dominion University CS TR-98-07, September 1998.
16. Michael L. Nelson, Kurt Maly, Stewart N. T. Shen and Mohammad Zubair, "A Multi-Discipline, Multi-Genre Digital Library for Research and Education," *Proceedings of ED-MEDIA 98*, Freiburg, Germany, June 20-25, 1998.
17. Michael L. Nelson, Kurt Maly, Stewart N. T. Shen and Mohammad Zubair, "NCSTRL+: Adding Multi-Discipline and Multi-Genre Support to the Dienst Protocol Using Clusters and Buckets," *Proceedings of the IEEE Forum on Research and Advances in Digital Libraries (IEEE ADL 98)*, Santa Barbara, CA, April 22-24, 1998, pp. 128-136. (Also available as ODU CS TR-97-40).
18. Sandra L. Esler and Michael L. Nelson, "The Evolution of Scientific and Technical Information Distribution," *Journal of the American Society of Information Science*, 49(1), 1998, pp. 82-91.
19. Michael L. Nelson, "Building Multi-Discipline, Multi-Format Digital Libraries Using Clusters and Buckets," MS Thesis, Old Dominion University Computer Science Department, August 1997 (Also available as NASA TM-112876).
20. Michael L. Nelson, Kurt Maly and Stewart N. T. Shen, "Buckets, Clusters, and Dienst," ODU CS TR-97-30, May 1997 (also available as NASA TM-112877).
21. Michael L. Nelson, Kurt Maly and Stewart N. T. Shen, "Building a Multi-Discipline Digital Library Through Extending the Dienst Protocol," *Proceedings of the Second International ACM Conference on Digital Libraries*, July 20-23, 1997, pp. 262-263.
22. Ming-Hokng Maa, Sandra L. Esler and Michael L. Nelson, "Lyceum: A Multi-Protocol Digital Library Gateway," NASA TM-112871, July 1997.

23. Michael L. Nelson and Sandra L. Esler, "TRSKit: A Simple Digital Library Toolkit," *Journal of Internet Cataloging*, 1(2), 1997, pp. 41–55.
24. Sandra L. Esler and Michael L. Nelson, "NASA Indexing Benchmarks: Evaluating Text Search Engines," *Journal of Computer and Network Applications*, 20(4), 1997, pp. 339–353.
25. Gretchen L. Gottlich, John M. Meyer, Michael L. Nelson and David J. Bianco "Integrating Information Technology Into Large Organizations," Chapter 17 in *Cases in Information Technology Management in Modern Organizations*, Mehdi Khosrowpour (Ed.), March 1997, pp. 210–225.
26. Michael L. Nelson and David E. Corder, "The Workstation Clustering Environment at NASA Langley Research Center," *Proceedings of the 3rd Annual Computational Aerosciences (CAS) Workshop*, NASA Ames Research Center, August 13–15, 1996.
27. Michael L. Nelson and Ming-Hokng Maa, "Optimizing the NASA Technical Report Server," *Internet Research: Electronic Network Applications and Policy*, 6(1), August 1996, pp. 64–70.
28. Richard C. Tuey, Mary Collins, Pamela Caswell, Bob Haynes, Michael L. Nelson, Jeanne Holm, Lynn Buquo, Annette Tingle, Bill Cooper and Roy Stiltner, "NASAwide Electronic Publishing System—Prototype STI Electronic Document Distribution: Stage-4 Evaluation Report," NASA TM-104630 (parts 1 and 2), May 1996.
29. Ming-Hokng Maa and Michael L. Nelson, "Recent Improvements in the NASA Technical Report Server," NASA TM-110209, October 1995.
30. Michael L. Nelson, Gretchen L. Gottlich, David J. Bianco, Sharon S. Paulson, Robert L. Binkley, Yvonne D. Kellogg, Chris J. Beaumont, Robert B. Schmunk, Michael J. Kurtz, Alberto Accomazzi and Omar Syed, "The NASA Technical Report Server," *Internet Research: Electronic Network Applications and Policy*, 5(2), September 1995, pp. 25–36.
31. Michael L. Nelson and David J. Bianco, "Accessing NASA Technology With the World Wide Web," *IEEE Aerospace and Electronic Systems Magazine*, 10(5), May 1995, pp. 7–13.
32. Michael L. Nelson, Gretchen L. Gottlich, David J. Bianco, Robert L. Binkley, Yvonne D. Kellogg, Sharon S. Paulson, Chris J. Beaumont, Robert B. Schmunk, Michael J. Kurtz and Alberto Accomazzi, "The Widest Practicable Dissemination: The NASA Technical Report Server," *Proceedings of Computers in Aerospace 10*, AIAA-95-0964, San Antonio TX, March 28–30, 1995.
33. Michael L. Nelson and David J. Bianco, "The World Wide Web and Technology Transfer at NASA Langley Research Center," *Proceedings Second International*

World Wide Web Conference: Mosaic and the Web, Chicago, IL, October 18–20, 1994, pp. 701–710.

34. Donna G. Roper, Mary K. McCaskill, Scott D. Holland, Joanne L. Walsh, Michael L. Nelson, Susan L. Adkins, Manjula Y. Ambur and Bryan A. Campbell, "A Strategy for Electronic Dissemination of NASA Langley Technical Publications," NASA TM–109172, December 1994.
35. Michael L. Nelson, Gretchen L. Gottlich and David J. Bianco, "World Wide Web Implementation of the Langley Technical Report Server," NASA TM–109162, September 1994.
36. Joseph A. Kaplan and Michael L. Nelson, "A Comparison of Queueing, Cluster and Distributed Computing Systems," NASA TM–109025 (Revision 1), June 1994.
37. Michael L. Nelson and Gretchen L. Gottlich, "Electronic Document Distribution: Design of the Anonymous FTP Langley Technical Report Server," NASA TM–4567, March 1994.
38. Trey Arthur and Michael L. Nelson, "Intel NX to PVM3.2 Message Passing Conversion Library," NASA TM–109038, October 1993.
39. Joseph A. Kaplan and Michael L. Nelson, "A Comparison of Queueing, Cluster and Distributed Computing Systems," NASA TM–109025, October 1993.

Presentations

1. Michael L. Nelson, "Open Archives Initiative," Workshop on Web–Based Language Documentation and Description, Philadelphia PA, December 12–15, 2000.
2. Michael L. Nelson, "OAI Implementation Experiences," Digital Library Federation Forum, Chicago IL, November 18, 2000.
3. Michael L. Nelson, "Review and Discussion of Implementation Issues," Extending Interoperability of Digital Libraries: Building on the Open Archives Initiative, ACM DL 00, June 3, 2000.
4. Michael L. Nelson, "Smart Objects and Dumb Archives: Using Buckets in Digital Libraries," ICASE Colloquium, Hampton VA, November 9, 1999.
5. Herbert Van de Sompel, Michael L. Nelson, and Thomas Krichel, "The UPS Protoproto Project," UPS Meeting, Santa Fe, NM, October 21–22 1999.
6. Michael L. Nelson, "Buckets: A New View for Digital Archives," EOSDIS DAAC User Working Group, Hampton, VA, September 9, 1998.

7. Michael L. Nelson, "Buckets: Aggregative, Intelligent Agents for Publishing in Digital Libraries," NASA Langley Research Center Technical Forum, Hampton, VA, July 15, 1998.
8. Michael L. Nelson, "Buckets: Aggregative, Intelligent Agents for STI Publishing," Presentation to the NASA STI Project Office, Hampton, VA, August 29, 1997.
9. Michael L. Nelson, "Understanding the Internet's Role in Technology Transfer and Organizational Strategy," October Meeting of the Pittsburgh Large User Group (PLUG), Pittsburgh, PA, October 24, 1996.
10. Michael L. Nelson, "Using DCE/DFS in a Production Workstation Cluster," ICASE/LaRC 2nd Industry Roundtable, Williamsburg, Virginia, October 7–9, 1996.
11. Michael L. Nelson, "WWW: An Overview of Technologies, Concepts, and Directions," Presented at the Multimedia Class for the Army Training Support Center, Fort Eustis, Virginia, June 24, 1996.
12. Michael L. Nelson, "The NASA Technical Report Server," Special Libraries Association 87th Annual Conference, Boston, MA , June 8–13, 1996.
13. Gretchen L. Gottlich and Michael L. Nelson, "The NASA Technical Report Server: Distributing NASA Technical Publications Using the World Wide Web," Special Libraries Association 86th Annual Conference , Montreal, Quebec, Canada , June 10–15, 1995.
14. Michael L. Nelson, "Workstation Clustering: Resistance is Futile," NASA LaRC Information Systems Division Seminar , Feb 17, 1995 .
15. Michael L. Nelson, "Changing the Way We do Business Through Use of the World Wide Web and NCSA Mosaic," Virginia Society of Professional Engineers , Oct 22, 1994.
16. Michael L. Nelson, "Use of World Wide Web and NCSA Mosaic at Langley," Computer Systems Technical Committee Workshop, "The Role of Computers in LaRC R&D", NASA CP–10159, Hampton, VA, June 15–16 1994, pp. 224–236.
17. Michael L. Nelson, "PVM Use in Computational Aerosciences Projects," First PVM Users Group, Knoxville, TN, May 10–11, 1993.
18. Michael L. Nelson, "PVM and the Intel Hypercube," 7 -> 9 Project Review, September 24, 1992.